The Compact Hyperspectral Aberration-Corrected Platform (CHAP), an Instrument for Microspacecraft., Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

In-situ analysis of solar system bodies plays a crucial role in understanding the evolution of our planet, setting the stage for life's origins. As has been demonstrated by several NASA interplanetary missions, there is no replacement for in-situ observations, like spectral imaging, that prove critical for understanding the context of solar system bodies. There is, however, a conflict between more capability at the target and the desire for minimizing mission cost. Minimizing the mass and power of an instrument reduce the size, complexity and therefore the mission cost. To enable more capable missions without high cost we propose to develop a hyperspectral/multispectral imager designed for a microsatellite platform that will function in a reduced light environment while minimizing the mass and power consumption. This type of instrument is crucial to the study of small bodies such as near earth asteroids and for missions further afield by maximizing capability while minimizing the instrumental cost and complexity. The Compact Hyperspectral Aberration-corrected Platform (CHAP) is proposed as a new, innovative instrument using an aberration-correcting holographic grating to make maximal use of two optical components, allowing for functionality over an optical bandpass (400-800 nm) with <100 microradian spatial resolution and 1.44 nm spectral resolution. The optical design of CHAP produces a white light zeroth order image from undiffracted light to be formed at the telescope focus, enabling the co-registration of spatial and spectral information, providing unprecedented context never before seen in an instrument for planetary and lunar science low-light observation. The CHAP spectrograph will be demonstrated in a 3U CubeSat-compatible form factor. Phase I activities will produce a proof-of-concept demonstration on an optical bench-top to a TRL 4 level. Follow on Phase II efforts will produce a CHAP with full capabilities for space environment qualification.

The Compact Hyperspectral Aberration-corrected Platform (CHAP), an instrument for microspacecraft. Project Image

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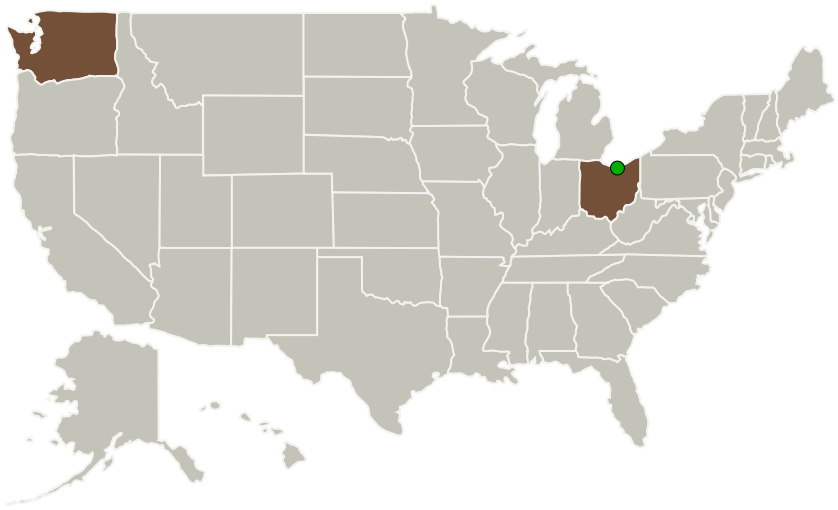
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Planetary Resources Development Corporation	Lead Organization	Industry	Bellevue, Washington
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Washington

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137375)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Planetary Resources Development Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Matthew Beasley

Co-Investigator:

Matthew Beasley

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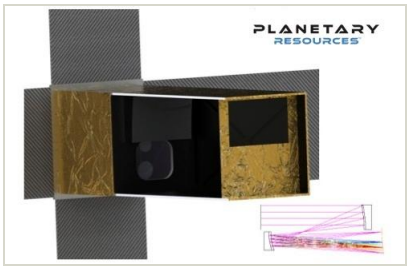
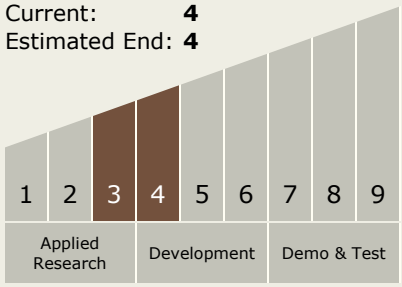
Images



Project Image
The Compact Hyperspectral Aberration-corrected Platform (CHAP), an instrument for microspacecraft. Project Image *(https://techport.nasa.gov/image/132318)*

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System